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ABSTRACT

Automaticity training was provided to an experimental group of eight high school sophomores whose reading achievement fell below the seventy-fifth percentile on the New Jersey Minimum Basic Skills Test to determine the effect of such training on reading comprehension. The 16 subjects (experimental and control groups) were pretested using the Gates MacGinitie Reading Comprehension Test, Level F, Form 1. Automaticity training involved the use of "An Adult Reading Writing Vocabulary: Phoneme Grapheme Experiences from the Grid System," and included concentrating 20 minutes per day on words considered to contain only one easily identifiable vowel sound and words considered to contain two or more syllables. The control group received instruction in a developmental curriculum, while the experimental group received instruction in the regular curriculum plus automaticity training for seven weeks. Posttest results indicated that the effect of automaticity training on reading comprehension achievement was not significant. (A section of related research on reading automaticity is included.) (HOD)

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THE EFFECT OF READING AUTOMATICITY ON THE COMPREHENSION OF HIGH SCHOOL SOPHOMORES

BY

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SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE
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MAY, 1986

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Abstract

The purpose of this study was to determine the relative effect of automaticity training on reading comprehension achievement. The control and experimental samples were each comprised of eight high school sophomores whose reading achievement fell below the seventy-fifth percentile on the New Jersey Minimum Basic Skills Test. Both samples were pre/post-tested using the Gates MacGinitie Reading Comprehension Test, Level F, Form 1, and grade equivalents were derived. Automaticity instruction was conducted with the experimental sample for seven weeks. A statistical analysis t test on mean gains in reading comprehension indicated that the effect of automaticity training on reading comprehension achievement was not significant.

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Reading is a multi-step complex process. Comprehension is the goal of reading. Effective comprehension cannot take place if the reader is unable to decode the words on the page. Decoding is the first step in the multi-step reading process. The more decoding ability one possesses, the better one will comprehend. Many readers spend a great deal of attention on decoding and have little attention left for comprehension. The step of decoding must be automatic so that attention can be centered on the comprehension process.

LaBerge and Samuels (1974) developed a theory of automatic processing in reading. The study evaluated the processing of information at the visual memory, phonological memory, and episodic memory stages. They concluded that meaning cannot be obtained from the printed word if attention is focused at these levels. Samuels (1979) suggested two ways to help students achieve automaticity in reading. Teachers can give instruction on how to recognize words at accuracy level and can provide motivation so the student will be able to practice these skills. He further stated that repeated reading is a method that provides the practice needed for automaticity.

Kolers (1975) added a dimension to the automaticity theory. He concluded that the well-practiced skill is composed of the loss of redundant and irrelevant procedures present in the unskilled act and depends on stored information. Samuels, Miller and Eisenberg (1978) found that with repetition of words, there was an increase in the size of the unit used in word recognition.

An increase in the size of the unit used in word recognition should then produce more fluent readers. Schreiber (1980) however,

stated that the acquisition of reading fluency involves more than automaticity. He concluded that fluency involves the fact that the reader must learn to compensate for the absence of graphic signals corresponding to prosodic cues by making use of morphological and syntactic cues.

The automaticity theory can influence the fluency of reading and can be useful in the diagnosis of reading problems. Readers may accurately recognize words but have difficulty comprehending what is read. The automaticity theory offers one reason for the cause of this problem. The decoding process requires too much attention by the reader and interferes with the comprehension process. If the decoding process becomes automatic, the reader's attention can be focused on improving comprehension.

If reading automaticity proves to yield gains in reading comprehension, automaticity training can be integrated into school curriculums. Automaticity is an invaluable skill for poor readers at the high school level. By diverting their attention from decoding to comprehension, the students will be using their developed oral vocabularies to aid them in deriving meaning. Many poor readers at the secondary level concentrate a great deal of energy on the decoding process and therefore never utilize their knowledge or word meaning to aid them in the comprehension process.

Hypothesis

To meet the purposes of this study a study was conducted to determine the relative effects of automaticity on reading comprehension achievement. It was hypothesized that there would be a significant

improvement in the reading comprehension of tenth grade students who failed the New Jersey Minimum Basic Skills Test as a result of training in automaticity.

Definitions

Accuracy - the student is able to recognize the printed words accurately but attention is required

Automaticity - the student is able to recognize the printed words accurately with little attention

Instructional Procedure and Sample

In March of 1985 all ninth grade students in this district were administered the New Jersey Minimum Basic Skills Test. The test was comprised of a reading comprehension and a mathematic section. Students who failed to attain a 75 in reading comprehension were placed in state compensatory education classes for the 1985-1986 school year. State compensatory education classes in reading are based on small group instruction, five days per week, for an entire school year. The classes are designed to remedy the basic skill deficiencies found on the Minimum Basic Skills Test. Students were placed in the classes on a random basis to coincide with the schedules they selected.

The students comprising the sample for this study attended a middle-class suburban school district. This school district operated under the trimester plan. The school year was divided into twelve week segments. At the end of each segment the students took exams and then moved to a new teacher. This experiment took place during the second trimester of the 1985-86 school year.

Two tenth grade state compensatory education classes were chosen to comprise the sample. Two classes of eight students each were randomly designated as the control and experimental samples. The sample of eight children in each of the treatment groups included five boys and three girls. Each treatment was, therefore, balanced as to sex characteristics. The two samples were unevenly matched as to age; the mean age of the control sample being 15 years 4 months and the mean age of the experimental sample being 15 years 8 months at the time of pre-testing (December, 1985). Students in both samples were unaware they were part of an experiment. The automaticity training received by the experimental sample was viewed as part of the regular curriculum.

Two teachers who possessed Bachelor of Arts degrees in English provided English and reading instruction to these classes. The design of the state compensatory education class was to provide integrated instruction of the developmental and remedial programs provided by the school district. The only limitation was that class size had to be half or less than half of the average developmental class.

Objectives for the second trimester were as follows:

1. The students will demonstrate reading comprehension through objective questioning and discussion of covered material.

2. The students will be able to demonstrate a knowledge of a given set of vocabulary words and definitions aimed at their level of knowledge and ability.

3. Study habits will continually be reinforced daily by the teacher verbally transmitting ideas and ways to remember things, follow directions, and understand.

4. Memory improvement shall also be reinforced daily by the teacher through quizzes, reviews, oral incentives, handouts, and discussions.

5. The students will be able to write introductory and concluding paragraphs.

6. At least one book report is a requirement of the course.

7. The student will be able to write paragraphs stating opinions and paragraphs of comparison/contrast.

Specific Procedure

Each treatment was administered the Gates MacGinitie Reading Comprehension Subtest (Level F) on the same day in December, 1985. All sixteen subjects were present in school the day of the pre-testing. The control sample then received instruction following the developmental curriculum for the remainder of the experiment. The experimental sample received instruction in the regular curriculum for the duration of the experiment plus twenty minutes per day of automaticity training for seven weeks. Both samples were administered the same final exam at the end of the twelve-week period.

Automaticity training involved the use of An Adult Reading Writing Vocabulary: Phoneme Grapheme Experiences from the Grid System. Each day the teacher of the experimental sample distributed automaticity training sheets at the beginning of the period. Training included words considered to contain only one easily identifiable vowel sound and words considered to contain two or more syllables. The teacher orally read down one column of words at a time. At the conclusion of

each column, the teacher asked the class for any words they did not know the meaning of. The teacher then offered a definition of the unknown word or words and used the words in context for the students. The students then read the list of words in unison without the direction of the teacher. This activity was repeated for several columns of words each day. Decoding (grapheme-phoneme correspondence) was not discussed by the teacher with the class at any time. Absent students were given the automaticity training missed upon their return to school on a one to one basis with the teacher.

At the conclusion of the seven week experimental period, both classes were post-tested on the same form of the Gates MacGinitie Reading Comprehension Subtest.

Results

Table one illustrates the findings as to the mean I.Q. of

Table I

Means, Standard Deviations, and t of the Samples on Intelligence

	MEAN	STANDARD DEVIATION	t test
Control group	98.13	8.17	1.49
Experimental group	92.50	6.87	

the samples. As indicated by the table, the mean I.Q. of the control samples was 98.13; and the mean I.Q. of the experimental sample was 92.50. Utilizing statistical tests to determine the significance of difference between the two treatments, a t of 1.49 was computed, indicating that no significant difference was present between the

means of the samples. It should be noted, however, that a difference of six I.Q. points did exist between the two samples, indicating a slightly higher level of intelligence within the control sample.

Table II illustrates findings in respect to reading comprehension

Table II

Means, Standard Deviations, and t of the Samples on the Reading Comprehension Pretest

	MEAN	STANDARD DEVIATION	t test
Control group	5.40	1.60	.32
Experimental group	5.18	1.22	

pretest grade equivalents for the control and experimental samples. As indicated by Table II, the mean pretest grade equivalent of the control sample was 5.40; and the mean pretest grade equivalent of the experimental sample was 5.18. A difference of two months existed between the two groups. Utilizing statistical tests to determine the significance of this difference between the two treatments, a *t* of .32 was computed, indicating that no statistical significance should be attached to this modest difference.

Table III illustrates findings in respect to post-test results

Table III

Means, Standard Deviations, and t of the Samples on the Reading Comprehension Post-test

	MEAN	STANDARD DEVIATION	t test
Control group	6.35	2.14	.48
Experimental group	5.93	1.19	

following seven weeks of automaticity training. The control sample experienced a gain of 9.5 months in reading comprehension in the period allotted; the experimental sample made a gain of eight months. The greater gain by the control sample might be attributed to the difference in intelligence between the samples as noted earlier and which existed at the outset of the experiment. A difference of four months in reading comprehension existed between the samples on this post-test. Utilizing statistical tests to determine the significance of difference between the means of the two treatments, a t of .48 was computed, indicating that no statistical difference was present between the samples in regard to reading comprehension at the time of the post-test.

Conclusions and Implications

The hypothesis established for this study that there would be a significant gain in reading comprehension of the experimental sample over the control sample after receiving automaticity training was negated since the difference between the means of the samples was not significant. At the conclusion of the study, both samples made gains, but the amount of gain by the experimental sample (7.5 months) was slightly less than that of the control sample (9.5 months).

Since the theory of automaticity training suggests some improvement in reading comprehension should result following automaticity training, procedures and experimental conditions were analyzed. The time frame of seven weeks, with twenty minutes per day of automaticity training, may not have been of sufficient length to affect response to print times. A longer period of time might be necessary for automaticity to develop. Interruptions during the seven week period might be another reason for the lack of significant gain by the

experimental sample. The seven week period was interrupted by a nine day vacation after the first week of training. Three vacation days were interspersed within the last four weeks of training. These interruptions in automaticity training may have had an adverse effect on the acquisition of automaticity.

Another possible reason for the lack of significance between the means of the samples might be seen as a result of the effect of changing teachers for the experimental sample. This change occurred during the fourth week of the study and produced a discipline problem with the experimental sample's daily class activities. Feelings of resentment toward the new teacher by the students existed. Though automaticity training was carried out according to schedule, the atmosphere of the group was markedly different. The group was uncooperative and unmotivated with the new teacher. A question about the quality of automaticity training therefore exists. The required amount of time was spent on task, but the effectiveness of the activity appeared to diminish. A period of adjustment between this teacher and her class existed for the duration of the experimental period.

The results of this study do not show a significant gain after automaticity training, nor do they show a loss. A gain of eight months in reading comprehension was present after the use of automaticity training for seven weeks in the absence of comprehension activities. The conclusion that automaticity training has a positive effect on reading comprehension is not warranted since a similar gain was made by the control sample and thus gains in both situations might be attributed to developmental growth.

Automaticity training might aid comprehension gain when comprehension instruction is given simultaneously. The freeing of attention from the decoding task is necessary for attention to be devoted to comprehension.

READING AUTOMATICITY: RELATED RESEARCH

The recognition of words is a complex process. Many models of word recognition are contained in the literature on reading. To say that one model of word recognition explains how words are processed is unrealistic. The reading skill of the reader may influence his choice of reading strategy as will the purpose and characteristics of the reading task. Automaticity in reading goes beyond beginning word recognition strategies and employs reading skills used by intermediate and fluent readers.

Because reading is a covert process, it is difficult to study. Reports on word recognition of fluent readers are in conflict. Some research describes the mature reader as using a holistic approach to word recognition; whereas other studies indicate that word recognition involves a serial scanning through the letters.

The following is a review of several word recognition models and the factors that influence the recognition process.

Holistic Processing Theories

The holistic process of word recognition involves seeing the word as a single unit, not as a series of letters. When the holistic approach to decoding is being utilized, the process involves the comparison of recognition time for a whole word and the recognition time of a single letter. If the recognition time for the single letter is the same as the recognition time for a whole word, the assumption can be made that the whole word is processed as a single unit.

Word recognition studies have been conducted for many years. As far back as 1885, Cattell conducted the first of two studies that supported the use of the holistic approach to word recognition for

skilled readers. Subjects were asked to read a short passage from Gullivers Travels. After the reading, the subjects were asked to name letters equal in number to the number of words in the selection. Cattell found that the time required to read the equal number of words and letters was about the same. He concluded that subjects recognized words as if they were responding to a single letter.

A second study by Cattell in 1885 used the tachistoscope he developed. The tachistoscope explored the exposure time necessary to perceive pictures, letters, and words. It allowed subjects brief, timed exposures to various sets of stimuli. Cattell found that words and letters were identified in much the same time. More letters could be identified when they formed words than in isolation, and twice as many words could be recognized when they were in context as opposed to random ordering.

Pillsbury (1897) presented words containing incorrect letters to his subjects via the tachistoscope. He found that subjects were able to identify the words correctly and concluded that subjects were using word shape to identify the words. Though configuration is not the same as the holistic approach to word recognition, there appears to be some correlation with holistic processing in this study.

Serial Processing Theories

Serial processing involves the letter by letter scanning of words to arrive at recognition. Stewart, James, and Gough (1960) determined that the time interval between presentation and response to a word increased as the length of the word increased. This indicates that subjects were processing the words letter by letter; hence, the increase in time between the presentation and the response.

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Another study which is supportive of serial processing was done by Johnson, Thomson, And Frincke (1960). Words of equal familiarity, but differing lengths, were presented by the tachistoscope. They concluded that the visual duration threshold was controlled by the length of the word.

Serial processing appears to be more prevalent for unfamiliar words. Once words become familiar to the subjects, holistic processing appears to take over. Fluent readers might engage in both types of processing depending upon the task at hand.

Automaticity

Automaticity has been defined in this paper as the ability to recognize printed words accurately with little attention. Literature referring to the word "automaticity" is limited, but as far back as Huey (1908) the idea of automaticity has been discussed. Dahl and Samuels (1973) refer to Huey as "capturing the essence of automaticity 65 years ago when he wrote:

> 'To perceive an entirely new word or other combination of stroke requires considerable time, close attention, and is likely to be imperfectly done, just as when we attempt some new combination of movements, some new trick in gymnasium or new serve at tennis. In either case, repetition progressively frees the mind from attention to details, makes facile the total act, shortens the time and reduces the extent to which consciousness must concern itself with the process.' (Huey, 1908, MIT Press 1968, p. 104)"

Hirst, et al. (1980) reported the results of two experiments that substantiate the hypothesis that the ability to divide attention is governed by the individual's level of skill. The conclusion states "when an activity ceases to exist in its original form, one may cease to experience it and may describe

it as automatic." An example of a skilled typist is offered. A skilled typist has the ability to do two things simultaneously. While two actions are occurring, attention can be on only one. The skill of typing has become automatic, which allows attention to be diverted to a secondary task.

Keele (1968) discusses the "attention to feedback" in skilled motor performances. He offers the conjecture "that while feedback is being processed, the processing of another signal would be delayed." It was further stated, however, that some surplus processing capacity is available to divert to another task, and that "repetitive movements, rather than requiring attention, might be performed better if attention were attracted to a secondary task."

Automatization, as defined by Schmidt (1968) is "the dropping out of conscious cues in learning a discrete series of motor acts." Schmidt went on to offer an evaluation of automatization. The evaluation is based on the subject processing two tasks simultaneously, and the proficiency of the secondary task indicating automatization of the first.

LaBerge and Samuels (1974) set forth a theory of automatic information processing in reading. Their criterion for determining the automaticity of a subskill or skill was that it could complete its process while attention was diverted elsewhere. An overview of the model presents the visual memory, phonological memory, semantic memory, and episodic memory stages.

The visual memory stage takes the mark from the page, such as letters, spelling patterns, and words and extracts visual information from them. Many different types of visual units can be processed at

this stage. A single letter, a combination of letters to form patterns or the whole word might be used for word recognition depending on the reading task.

The phonological memory translates the symbols and their corresponding sounds and derives meaning from them. The semantic memory contains information about specific events. Episodic memory information can be used only when the new task matches the initial situation.

Visual, phonological and semantic memory are the most important for the purpose of reading. The print is taken from the page and transformed into sounds and meaning is derived from the sounds. The path that is taken depends upon the skill of the reader and the purpose behind the reading task.

Attention is the most important factor of the model. Attention refers to the amount of mental energy required to perform a task. If attention must be focused at each of these stages and each of the units, there is little available attention when the reader arrives at semantic processing.

An unskilled reader focuses attention first on decoding, the visual and phonological memory stages, and then on comprehension, the semantic memory stage. A skilled reader can decode and comprehend at the same time. The skilled reader thus reaches the criterion set by LaBerge and Samuels for automaticity.

Two modes of information processing are presented by Schneider and Shiffrin (1977). The first mode is classified as slow. The beginning reader may decode words letter by letter at a relatively slow rate; and because attention is required on the task, comprehension is

minimal. The second mode is fast and automatic. A skilled reader may process whole words quickly without attention, thus freeing the attention for comprehension. Schneider and Shiffrin pointed out that the knowledge of the existence of the two modes is important, as is understanding the mechanisms of learning by which movement is made from the first mode to the second.

Automatic processing is defined by Schneider and Shiffrin as "the detection and recognition of visual information in an automatic fashion not dependent on the amount or kind of other information presented simultaneously." The term controlled processing is defined as "the detection, recognition or short term search that proceeds in a serial, feature by feature fashion in an order controlled by the subject."

Automatic processing, as concluded in the study, develops with training and is part of long term memory. It operates independently of and simultaneously with other processes. The attention of the subject is not required and control by the subject is not exhibited in automatic processing. Controlled processing is a short term memory operation which can be utilized without extensive practice but requires the attention of the subject.

Schneider and Shiffrin establish a relationship between reading and these processes. The beginning reader slowly identified words letter by letter and has no capacity left for sentence or paragraph meaning. The experienced reader automatically identified words and letters and can utilize his capacity on the meaning of the material.

Samuels and Chen (1971) studied the differences in word recognition strategies between children and adults. Twenty-five fourth

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graders and twenty-five college students were administered tests of various word recognition strategies. The purpose of the study was to provide an answer to the following question, "If adults recognize words more rapidly, what difference in recognition strategies gives adults this advantage?"

A four stage word recognition model was used. The first of the four stages was information use. Information from material already read was used. The second stage was hypothesis making. The reader makes use of material already read, plus general knowledge of English to hypothesize what the next word will be. The third stage is the test stage. The hypothesis from stage two is tested using information from the next word in the passage. The final stage is the accept/reject stage. If the new information matches a hypothesis, it is accepted. If the information does not match, it is rejected and the reader must visually decode the word.

A tachistoscope and ten-word pairs were used to test recognition speed of children and adults. The word strategies test was then given. Samuels and Chen found that in every condition adults were faster at recognizing flashed words. They concluded that when words were flashed at speeds too fast to recognize, adults were able to see more of the letters then children at faster speeds.

Smith and Holmes (1971) analyzed fluent reading skills. They concluded that fluent readers can identify words "with only half the featural information that would be required if prior letter identification were necessary. The good reader picks up bigger units implying that the visual system processes more information if stimulus can be chunked or coded."

Automaticity of Word Recognition

Automaticity of word recognition using phonics and whole-word instruction was investigated by Spring (1978). The study involved college students learning to read words spelled with artificial orthography, using phonics and the whole-word approach, through over-learning. Vocalization latency was measured over a series of trials which extended beyond perfect accuracy. A decline in vocalization latencies indicated that responses were becoming automatic, since they required less attention. Spring's purpose was to determine if response latencies declined under both phonics and the whole-word approach. He also wanted to determine which method resulted in word recognition similar to that of a fluent reader. The study concluded that whole-word training did not result in more automatic responses than phonics training. Responses by phonics subjects were actually faster in the early over-learning trials. Whole-word training did result in a recognition process more similar to that employed at a much later stage of automaticity, while training in phonics did not.

Samuels (1979) advocated the method of repeated reading to improve fluency. He traced the development of word recognition skills through three levels. He refers to the first level as the non-accurate stage. A great deal of time is required for word recognition and even then the student has great difficulty recognizing words. The accuracy stage involves correct recognition, but requires attention. The reading at this stage is characterized by slow, halting phrasing and lack of expression. The more advanced level is the automatic level. The printed word is recognized without attention. The oral reading rate is fast, even faster than speech at times, has expression, and compre-

hension should be high for familiar material. Samuels stresses the importance of repeated reading is that "it provides the practice needed to become automatic."

Automatic Decoding and Comprehension

Once the decoding process has reached the level of automaticity, the comprehension process receives the full attention of the reader. Since the reader only has the capacity to attend to one thing at a time, if decoding is automatic, the reader will not have to switch bhack and forth between the two tasks, but can instead totally attend to comprehension.

Stanovich (1980) describes the rapid word identification of fluent readers as simply short-circuiting the conscious-attention mechanism. He further goes on to state that the fluent reader, "recognizes words rapidly and mostly on the basis of physical cues, so that expectancy processes that draw cognitive capacity are not needed. Thus his capacity is being used for comprehension, rather than for conscious prediction processes that aid individual word recognition." The conclusion states that the performance of the fluent reader is due to automaticity that requires no attention on word recognition but allows capacity to be freed for comprehension.

The semantic level of processing is discussed by Schwartz (1980). He states that when attention is required at lower levels (word recognition) a serial processing component begins and detracts from the semantic level of processing.

Spring, Blunden, and Gutheral (1981) reported on the effect on reading comprehension of automaticity training in word-reading.

Automaticity training aimed at decreasing latencies to read a specific set of words was given to an experimental group consisting of twenty-four third-graders. A control group consisting of twenty-four third-graders received no training. A cloze method test was used after training to test reading comprehension of trained words. The researchers concluded that no evidence was found to support the transfer of automaticity training to reading comprehension.

The researchers did question the validity of the comprehension test to the training received by the experimental group. Another reason for the lack of transfer might be that the experimental group was not trained to automaticity. A third reason could be that automaticity training might improve comprehension of poor readers, but the experimental group was reading at grade level prior to the training.

Fleisher, Jenkins, and Pany (1979) conducted two experiments designed to examince the effects of increased decoding speed of poor readers on comprehension. In the first experiment, poor readers were trained to read a list of words as quickly as proficient readers. Then they were asked to read a passage made up of the trained words. Decoding speed measure on the word list, and comprehension measures on the passage were attained. The performance of good and poor readers was compared. The results showed that automatic decoding training on single words in lists produced increased decoding speeds of single words but had no effect on comprehension proficiency.

Samuels (1976) discusses automatic decoding and comprehension. He restates his views from previous articles about decoding automaticity freeing the attention for comprehension. He stresses that decoding automaticity is a skill of able readers. He offers reasons why some

readers who have automatic decoding tasks still fall down on the comprehension task. Attention wandering away from comprehension is the cause of poor comprehension according to Samuels. The decoding automaticity diverts the attention to comprehension, but the attention is not focused; therefore, comprehension does not take place.

The review of the literature on reading automaticity indicates decoding must be automatic so that attention may be devoted to comprehension. The research does not indicate that a growth in automatic decoding will promote gains in reading comprehension without instruction in reading comprehension. Automaticity training yields results in automaticity but does not transfer this growth to the comprehension process. The research suggests the need for automatic decoding, but also suggests a need for comprehension instruction after the attainment of automaticity.

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APPENDIX

Intelligence Quotients

Control Sample	I.Q.
1	86
2	87
3	98
4	99
5	100
6	100
7	105
8	110

Experimental Sample	I.Q.
1	84
2	84
3	87
4	91
5	96
6	99
7	99
8	100

Pre-test and Post-test Results

Control Sample	Pre-test Raw Score	Grade Equivalent	Post-test Raw Score	Grade Equivalent
1	17	5.6	14	4.5
2	19	6.1	27	8.8
3	22	7.0	29	9.8
4	20	6.4	19	6.1
5	04	3.3	16	5.3
6	23	7.3	24	7.6
7	04	3.3	14	4.5
8	13	4.2	13	4.2

Experimental Sample	Pre-test Raw Score	Grade Equivalent	Post-test Raw Score	Grade Equivalent
1	2.0	6.4	19	6.1
2	19	6.1	19	6.1
3	13	4.2	13	4.2
4	19	6.1	23	7.3
5	15	4.9	18	5.8
6	20	6.4	19	6.1
7	11	3.5	22	7.0
8	12	3.8	13	4.2